

Abstract

A reciprocating and rotating magnetic refrigeration apparatus adopts a dynamo concept and the design of magnetic supply path and heat transfer unit to alternately magnetize and demagnetize a magnetocaloric material to generate thermo-magnetic effect for cooling. The apparatus includes magnetocaloric material located on the head of stator nose poles, magnetic supply coils surrounding the magnetocaloric material, permanent magnets located on a rotating stator, and a heat transfer unit in contact with the magnetocaloric material. Two adjacent magnetocaloric materials magnetize and demagnetize alternately to alter the temperature and entropy of the magnetocaloric material, and through the heat transfer unit, heat exchange occurs between the magnetocaloric materials and the atmosphere to achieve the cooling effect.